

The following presentation
on

Connecting the PSA

And

DDFT Reflex

is formulated from professional and clinical studies carried out by

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Grad Dip Animal Chiropractic CVA

Connecting the PSA and DDFT Reflex

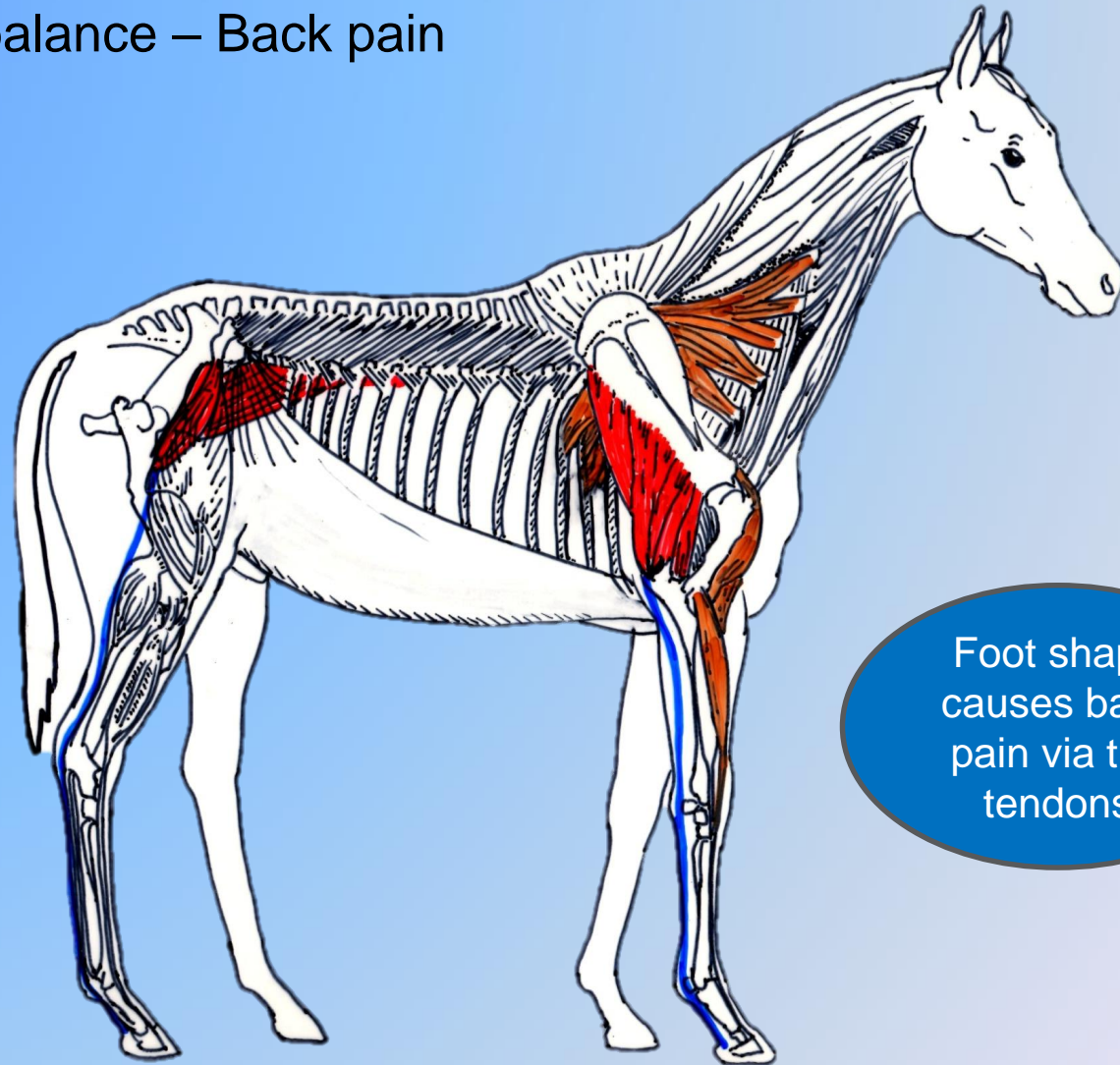
Establish that
this was more
than a placebo

Explain the
possible
mechanisms

Using a HVLA
impact with an
activator on the
DDFT on an
unbalanced foot
would consistently
remove the back
pain resulting from
that imbalance



Foot shape and balance – Back pain



Multifidus m
and
sacrocaudalis
dorsalis m

Foot shape
causes back
pain via the
tendons

McGowan C, Stubbs N, Hodges P and Jeffcott L *Back Pain in Horses Epaxial Musculature* November 2007
RIRDC Publication No 07/118
Harman J *The Horse's Pain-Free back and Saddle –fit book* Trafalgar-Square Publishing Vermont 2004

ESTABLISHING BACK PAIN

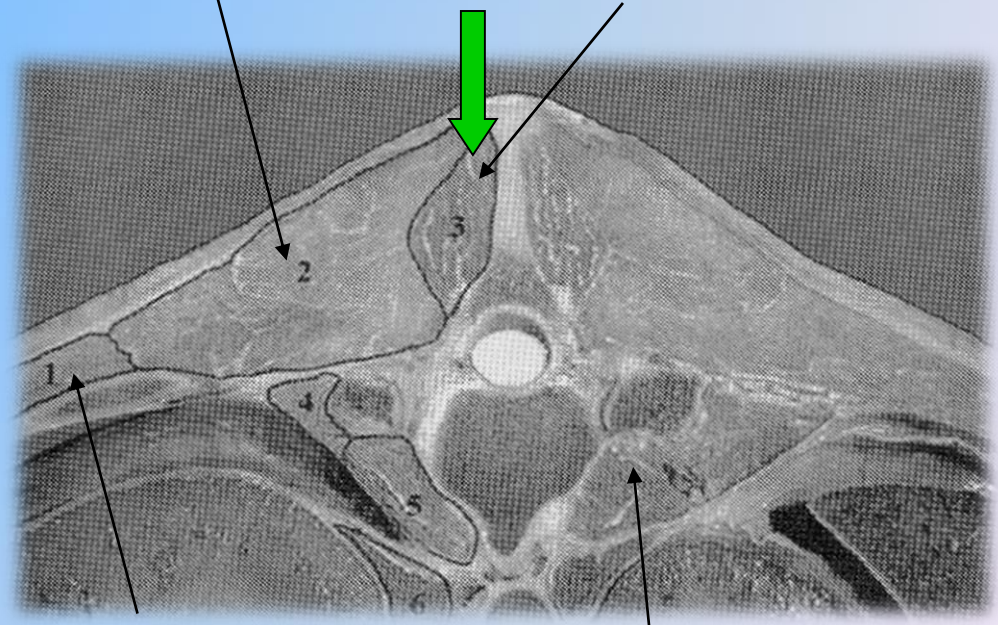
Opportunity to palpate
intrinsic spinal muscles

Pain lateral to this point may
have different implications

The position and direction of the
palpation is important, there is no
need to press hard

Longissimus

Multifidus



Iliocostalis

Psoas

From Clinics of North America, Back Problems: Dr K Haussler.

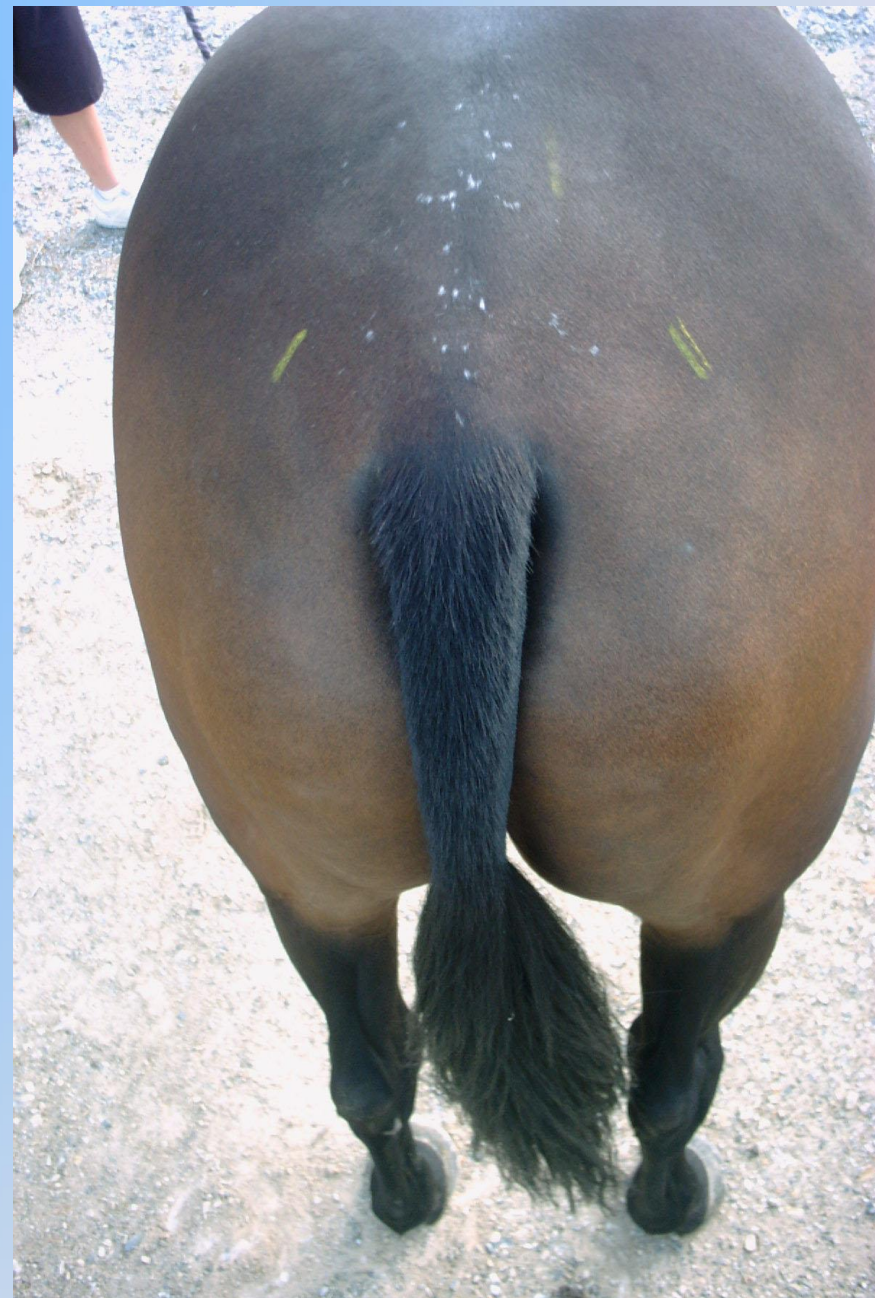
Testing back for
back pain



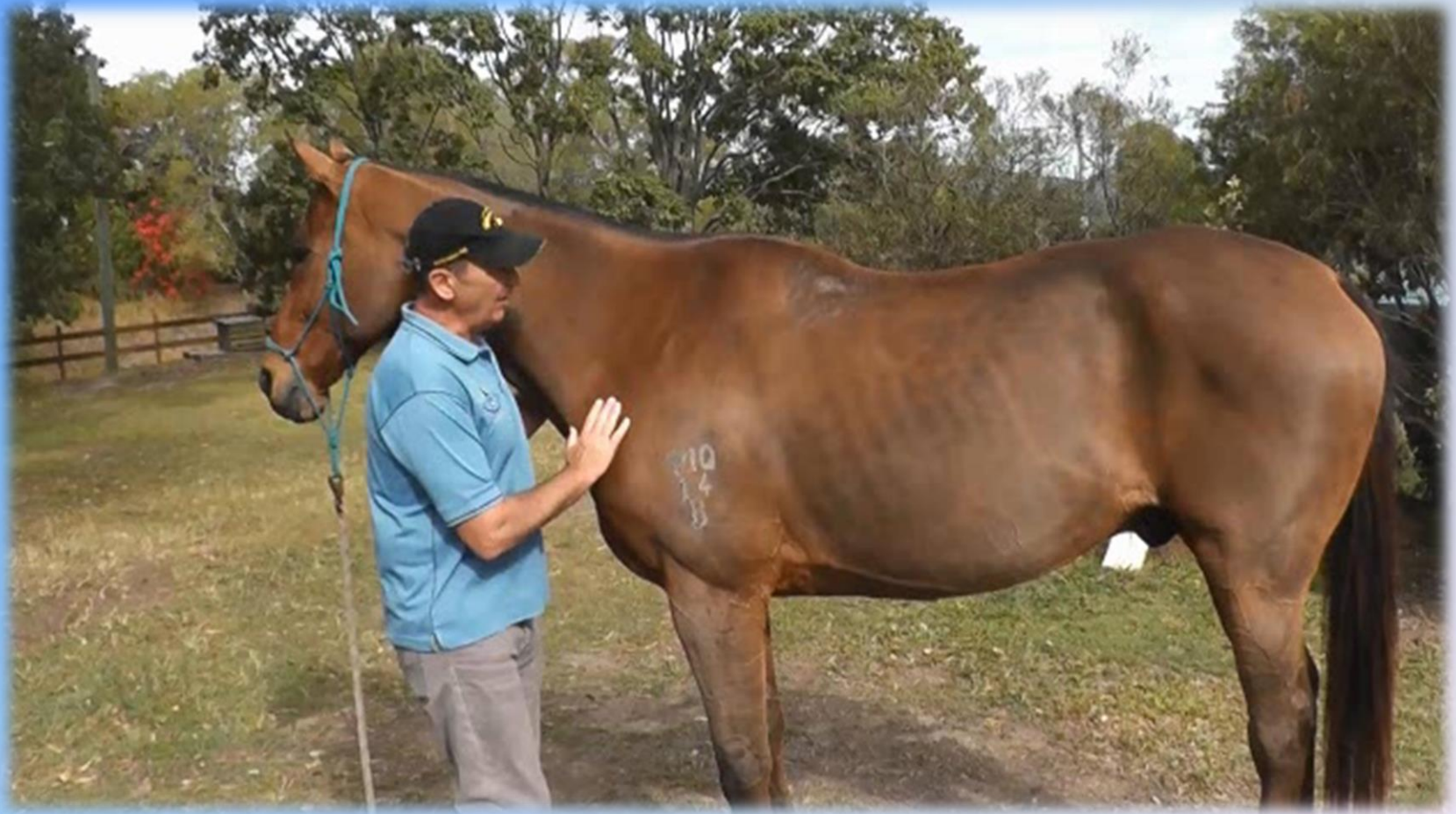
EXAMINING FOR PAIN AND REACTIVITY



Uncorrected hoof capsule angle and height differences result in chronic back pain and undesired behavioural changes



SIGNS OF STRESS WITH FOOT IMBALANCE



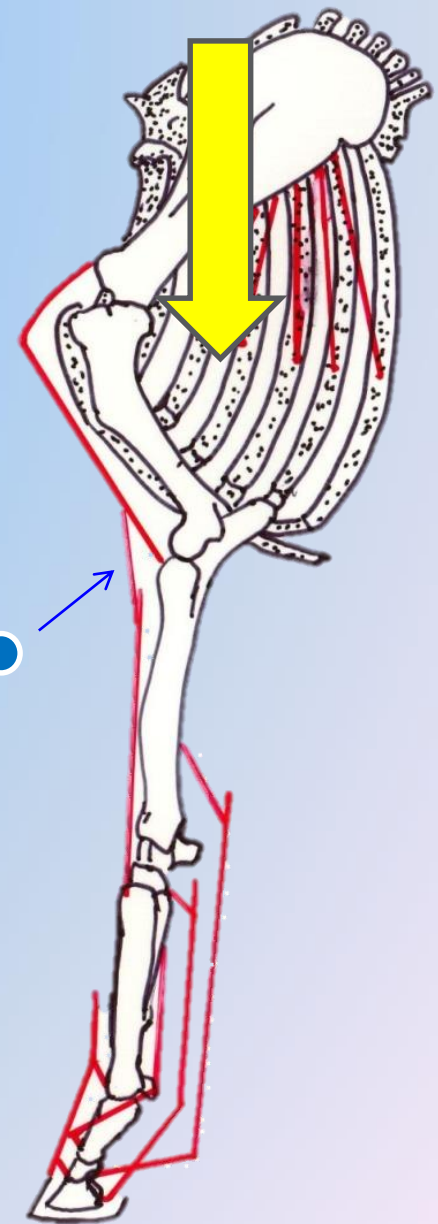
LACERTUS FIBROSIS

Extrinsic muscles are large and long, parallel fascicles, low muscle to tendon length ratio = work

Serratus VT had very short fascicles compared to aponeurosis length = elasticity

Lacertus fibrosis, tension variation with imbalance, also elasticity

Origin, biceps brachii (scapula) & deep fascia of forearm inserts on carpi radialis (metacarpus)



First Rib

- Derived from thoracic outlet syndrome in humans
- The Scalenus muscle originates from first rib and inserts transverse process C7

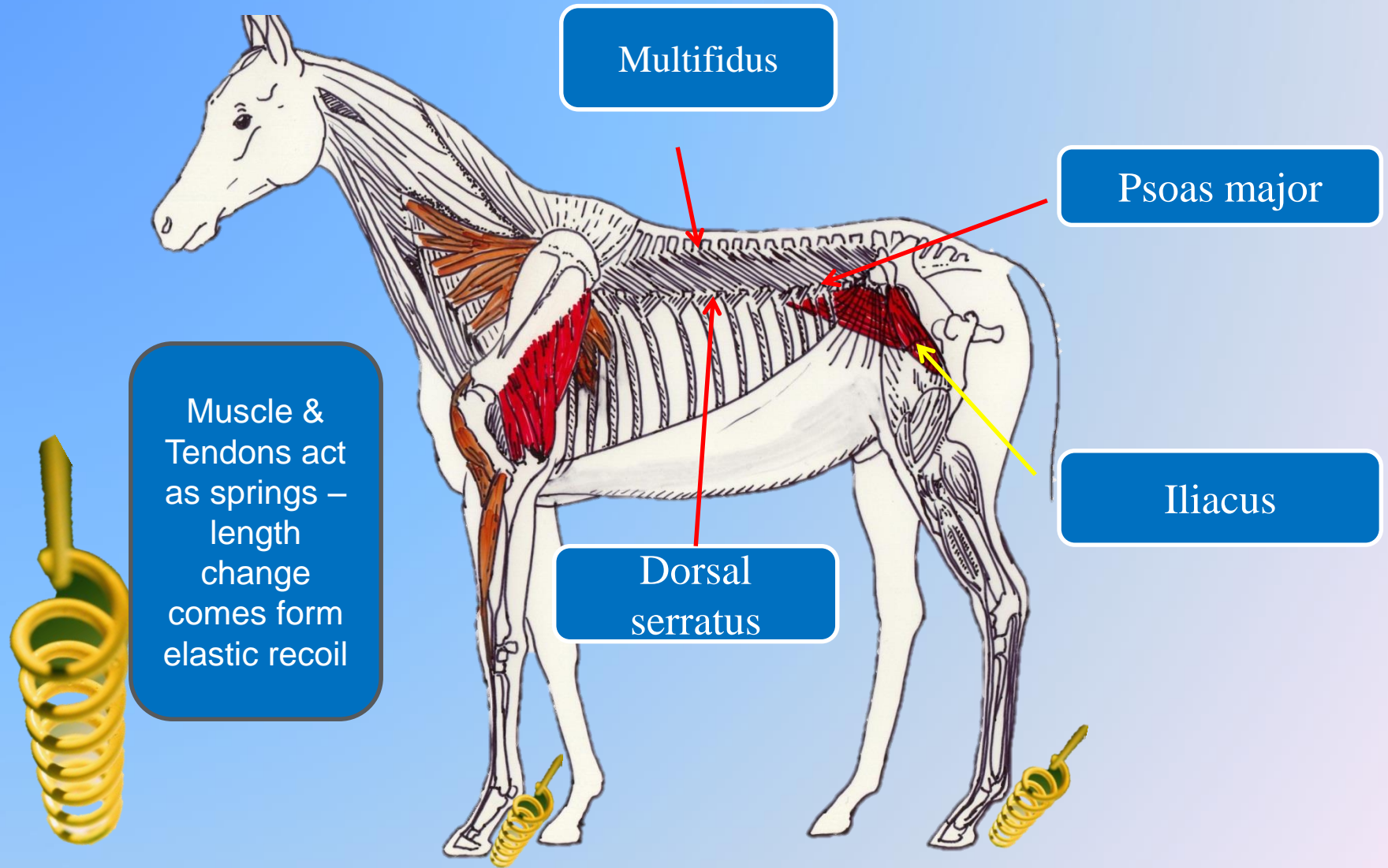
Elevates first rib, aiding in inspiration

Flexes neck

Bends neck laterally



Muscles and tendons



RC Payne, P Veenman, and AM Wilson The role of the extrinsic thoracic limb muscles in equine locomotion J Anat. Feb 2005; 206(2): 193–204.

FOOT PLACEMENT

Chronic stress on the fore limb, often from incorrect hoof angles, increases work, as the effect of elastic recoil reduces. Tested by foot placement test.



BACK PAIN MEASUREMENT

Need to measure back pain

Algometer will
quantify measurement

Remove inter-operator
variance

Standardised human
studies



Wagner Force Dial Algometer

Normal or
Standard

Pain
Reaction

Repeatability

Reliability

Blinded

10kg in 100gm gradations

Avoidance reaction

Measurements repeated



ALTERING FORELIMB FOOT BALANCE

Wedges inserted to alter medio-lateral balance

Muscle tension patterns in less than 10 days



Significant mid-thoracic back pain in 14 days



Measurement of mid-thoracic back pain

Algometer reading after plastic wedge insertion (Gr)

Case	7800	7700	5600	4200
1 (8 year old grey gelding)				
2 (9 year old bay gelding)	8200	8100	4900	3400
Day	3	5	8	
0 (insert wedges)				

Mean in four horses not showing back pain bilaterally between T8 and T12 7410

ALTERING HIND LIMB FOOT BALANCE

Pain measured over pelvis and lumbar spine



Pain can extend up into mid thoracic region

ALTERING HIND LIMB FOOT BALANCE

Significant pelvic and lower-lumbar back pain in less than 14 days

Muscle tension patterns in less than 12 days



Measurement of lumbar and sacro-pelvic pain

Case 1 (8 year old grey gelding)	L 6200 SP 6110	L 6200 SP 5900	L 3450 SP 5100	L 3100 SP 3450
2 (9 year old bay gelding)	L 5800 SP 6350	L 6100 SP 5100	L 4100 SP 4400	L 3800 SP 3400
	Day 0	3	5	8

Algometer reading after inserting plastic wedge in lateral side of back foot under shoe

Consequences



Resisting lead

Reduced cervical lateral flexion

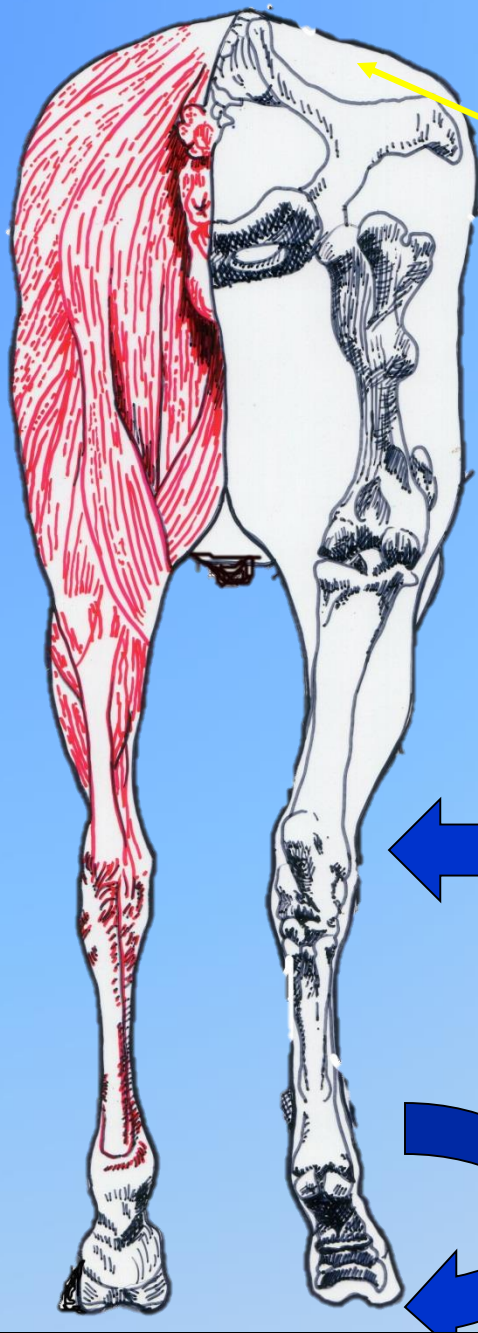
Pain through the mid thoracics

Overworking lumbar spine

Sacroplevic pain centres

Atrophy of the epaxial muscle groups

Reduced retraction and protraction hind limbs



Stabilisation through adductors and
gluteal muscles



Medial – heel rotates inwards on impact

Reducing muscle tension in the hind limb muscles



1. Triple flexion and hold
2. Greater adductor stretch
3. Stretch cranial and caudal

NAVICULAR – DDFT STUDIES



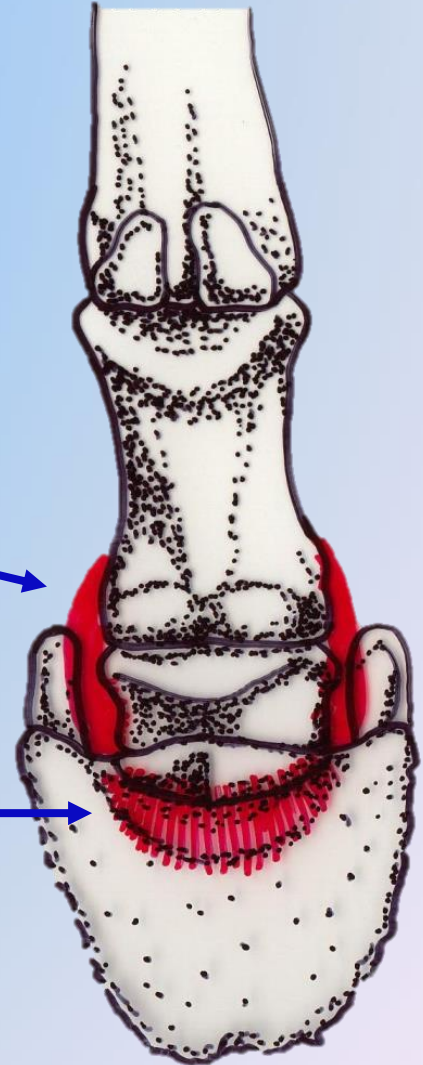
Tendon reflex at lower limb relieved back tension and back pain

NAVICULAR LIGAMENTS

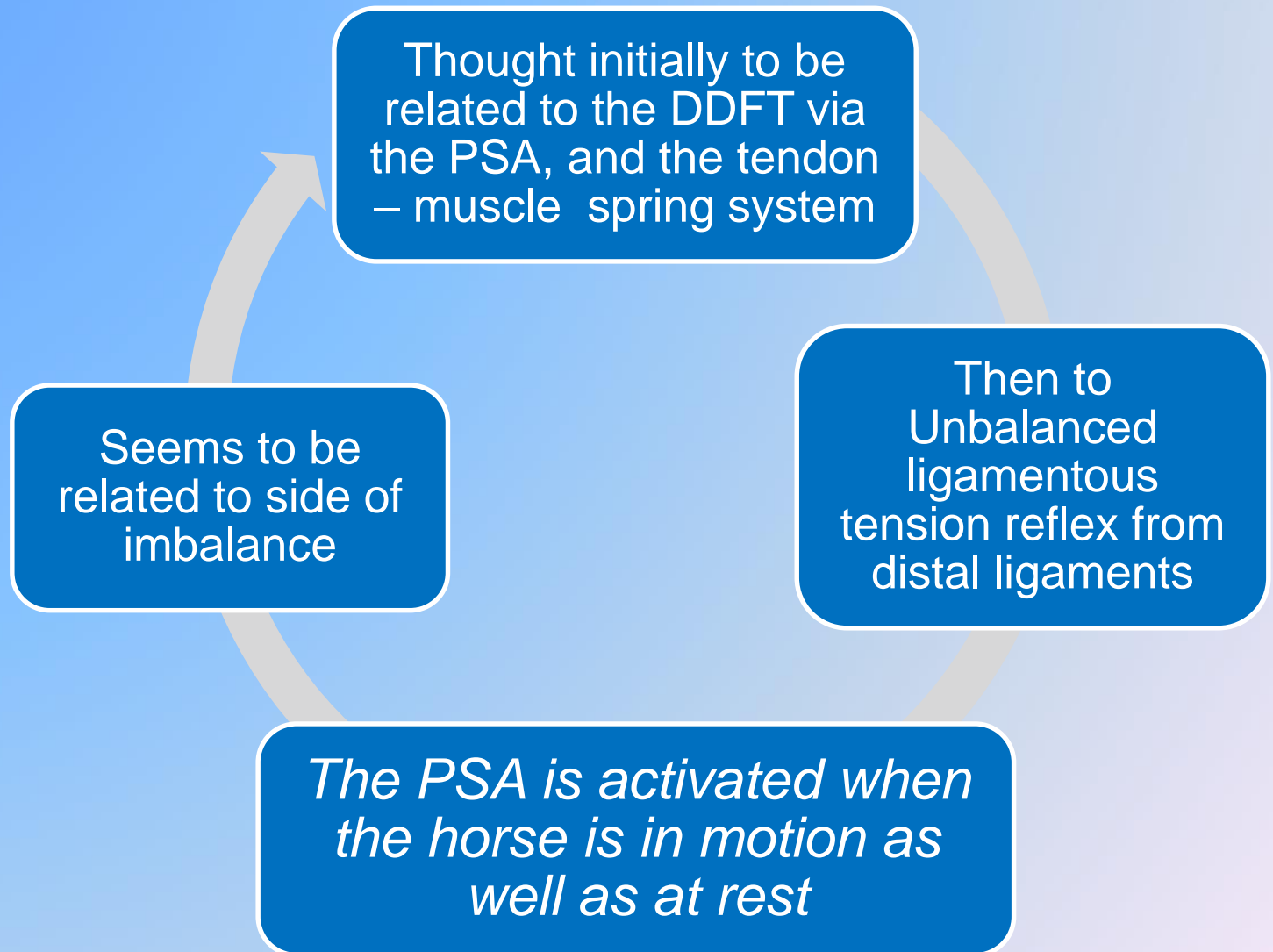
Unbalanced
ligamentous tension
in the distal limb,
reflex pain in the
spine

Lateral collateral sesmoidian ligament
of
Navicular bone

Distal sesmoidian impar
ligament



NAVICULAR – DDFT STUDY



NAVICULAR – DDFT STUDY



NAVICULAR – DDFT STUDY

After being used in treating 898 cases of back pain over 31 months

In order to verify the hypothesis “that back pain is not influenced by hoof balance” it was proposed to measure pain over the mid thoracic area with the algometer before and after one strike of the activator over the DDFT in the direction of the navicular bone

NAVICULAR – DDFT STUDY 1

Balance on visual inspection	Number	Mean pre treatment	Mean Post treatment
Medio-lateral And/or Latero-mediall	21	2700	6200
Hi Heel/Lo Heel	14	2850	7100
Hi-Lo and Medio lateral	4	2600	5500

Measurement in grams

NAVICULAR 2 – DDFT STUDY

Balance on visual inspection	Number	Mean pre treatment	Mean Post treatment
M-L L-M side of Max stress	15	2670	6200
Hi Heel/Lo Heel Lo side	8	2850	3250
Hi-Lo Hi side	4	2670	4050

Measurement in grams

NAVICULAR – DDFT STUDY



The forelimb reflex release relieves back pain in every case when there is a forelimb foot imbalance present

The hind limb reflex relieves back pain when hind limb foot imbalance is present

Selecting the position

Side of
pain

Visual

Feel for
changes



DDFT REFLEX



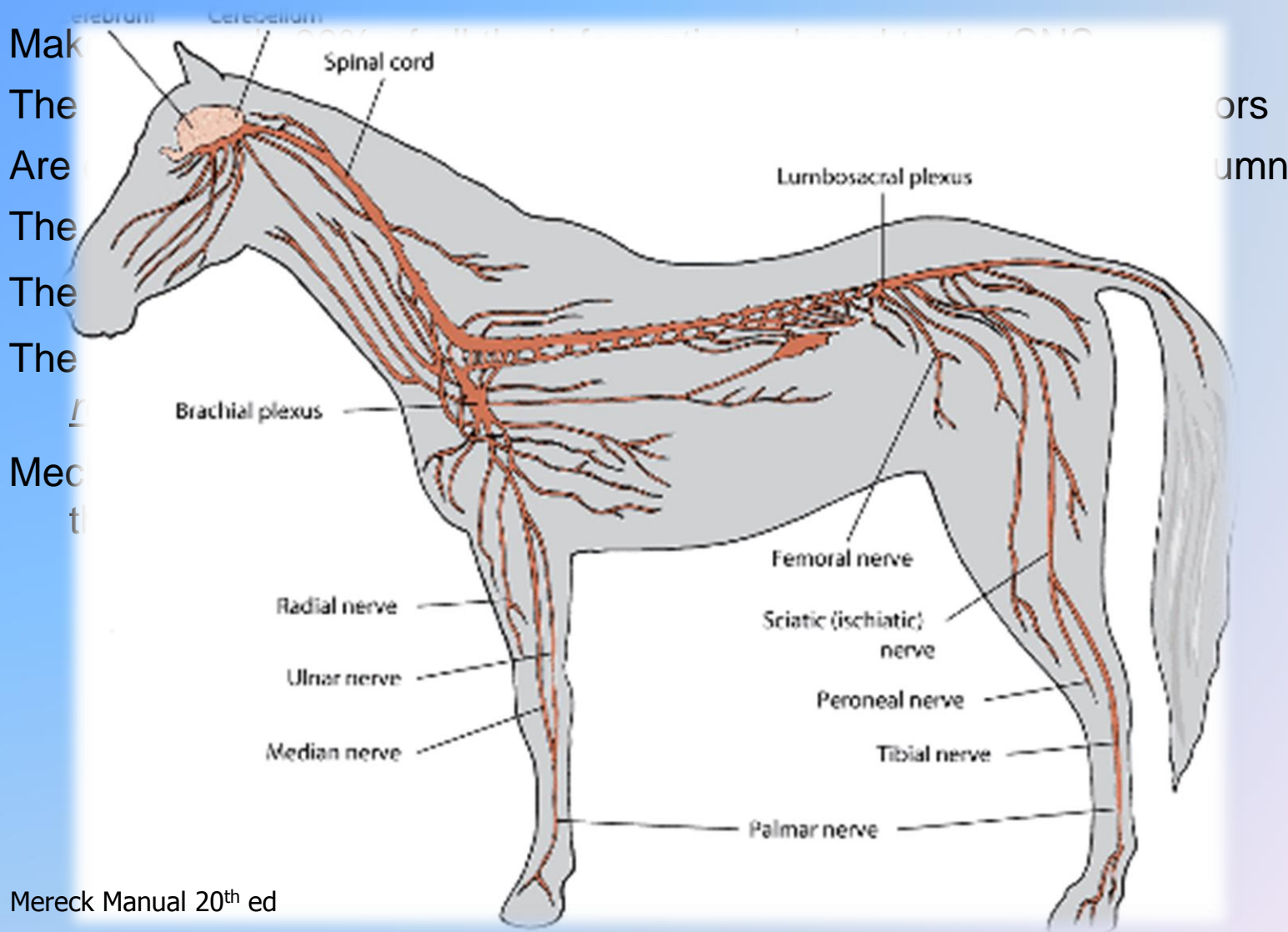
DIAGNOSIS

In the event that there is doubt about the functional morphology of the feet, the DDFT reflex can be used as a guide to the problem

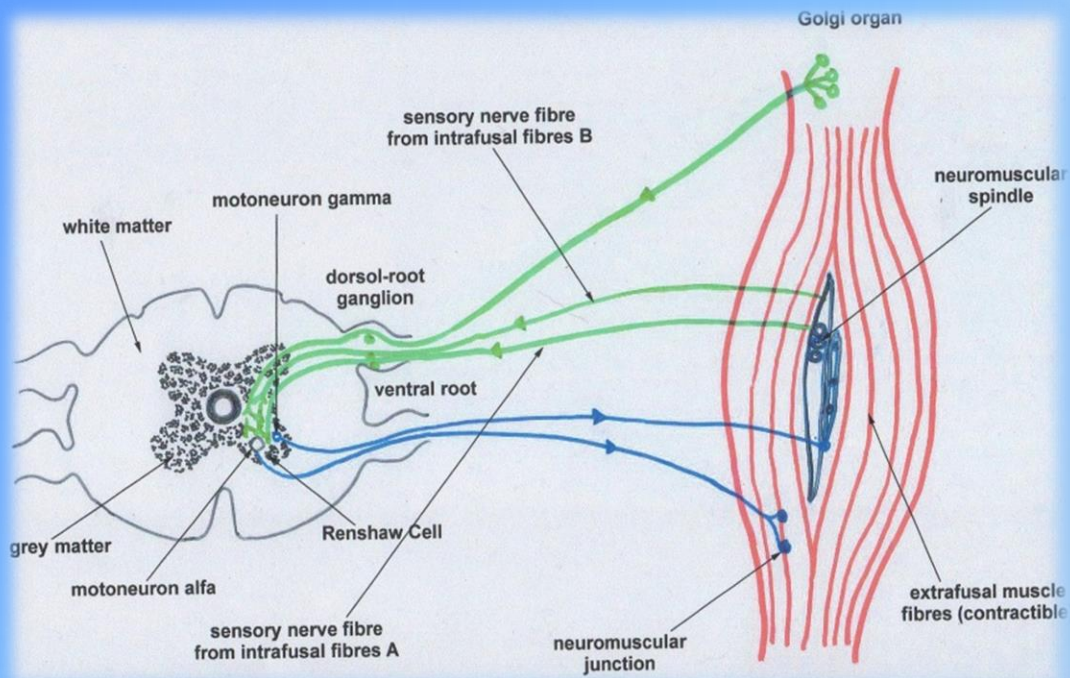
If the reflex clears the back pain then it is an indicator that foot balance is playing a role in this case.



MECHANORECEPTORS



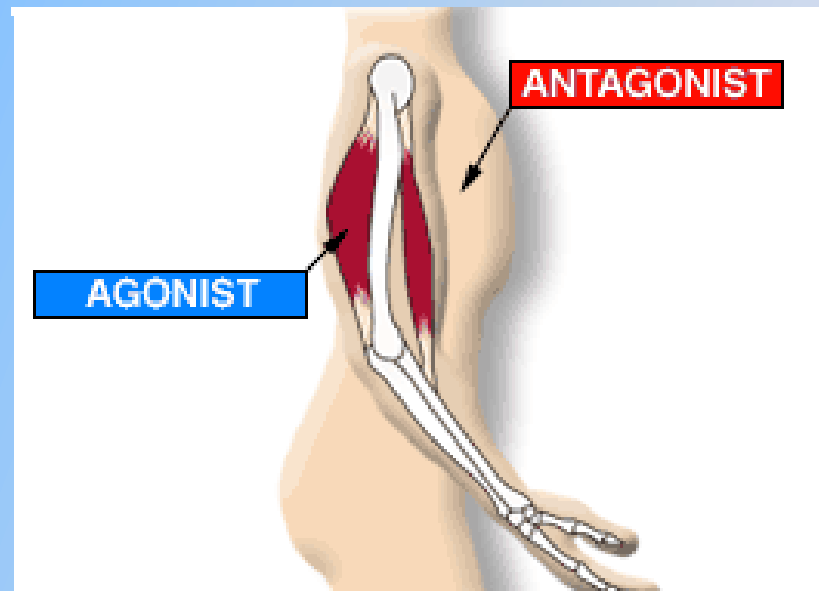
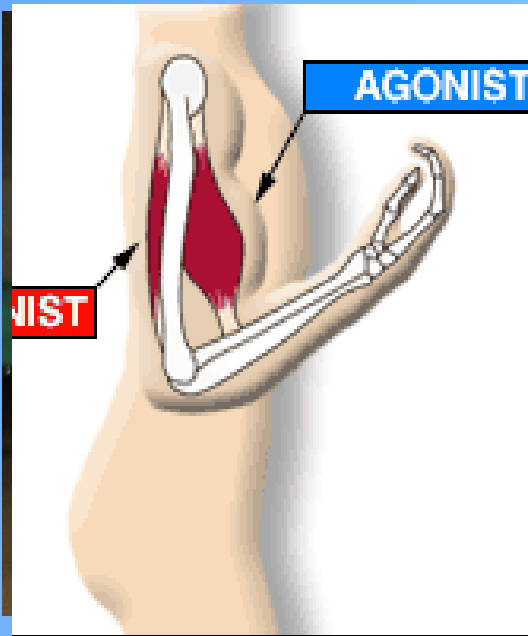
Mereck Manual 20th ed



The **tendon reflex**, also known as the **T-reflex**, is found in humans and occurs when pressure on a **tendon** causes it to relax and snap back immediately afterward.

Although this step-by-step analysis seems to take time, the process is rather ephemeral, usually taking place in a fraction of a second. The Golgi **tendon reflex** is somewhat opposite another commonly studied action, known as the stretch **reflex**.

Golgi tendon reflex is the opposite of a stretch reflex. Contracting muscle activates Golgi tendon organ (GTO). Afferent Golgi tendon organs are stimulated, neurons inhibit the contracting muscle, and the antagonistic muscle is activated. As a result the contracting muscle relaxes and the antagonistic muscle contracts



DEEP TENDON REFLEX



Include the
back
muscles?

Contraction of
muscle
Extensors
(agonists)



Golgi tendon
organ



Relaxation of
agonist
(extensor)



Inhibitory
pathway



Reciprocal
activation
contraction
antagonist



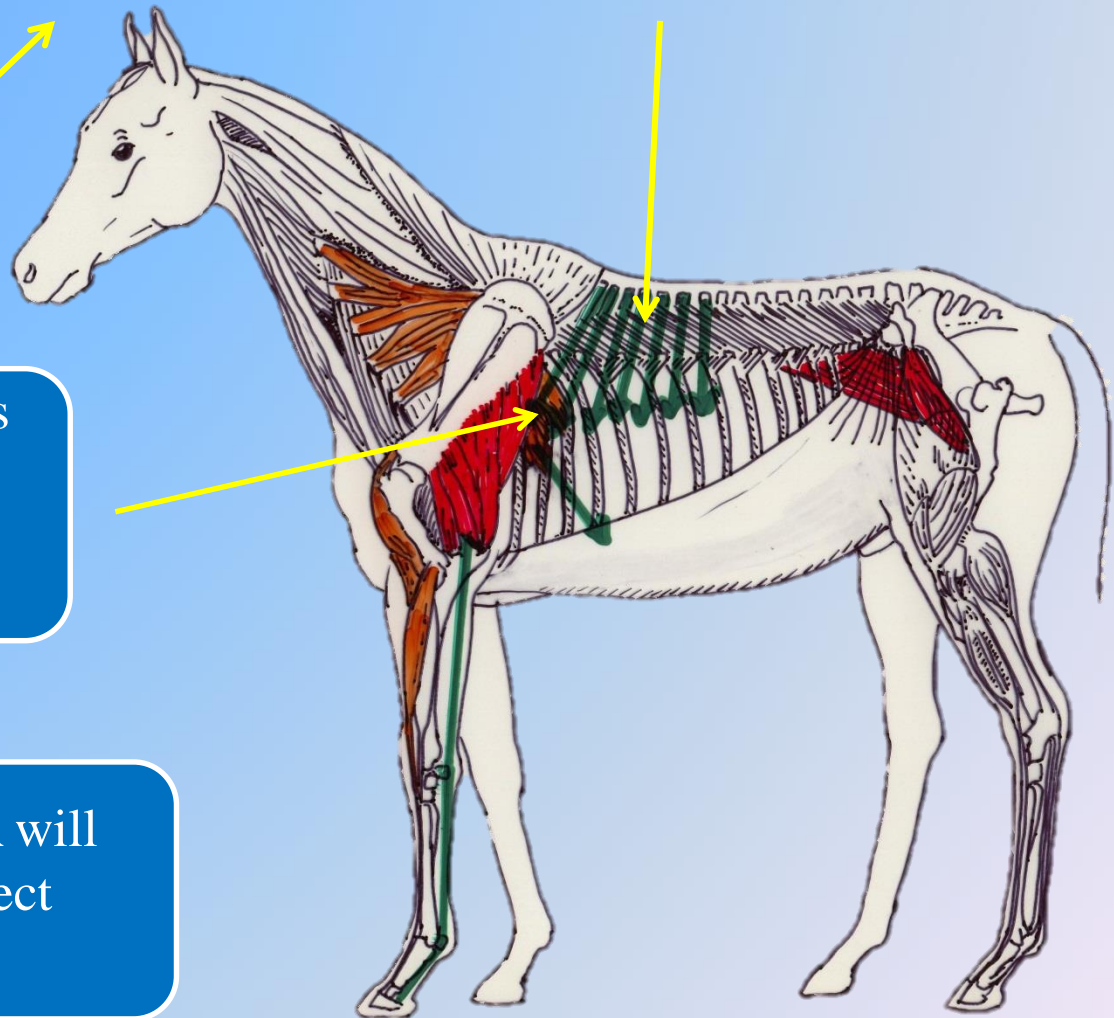
Excitatory
pathway

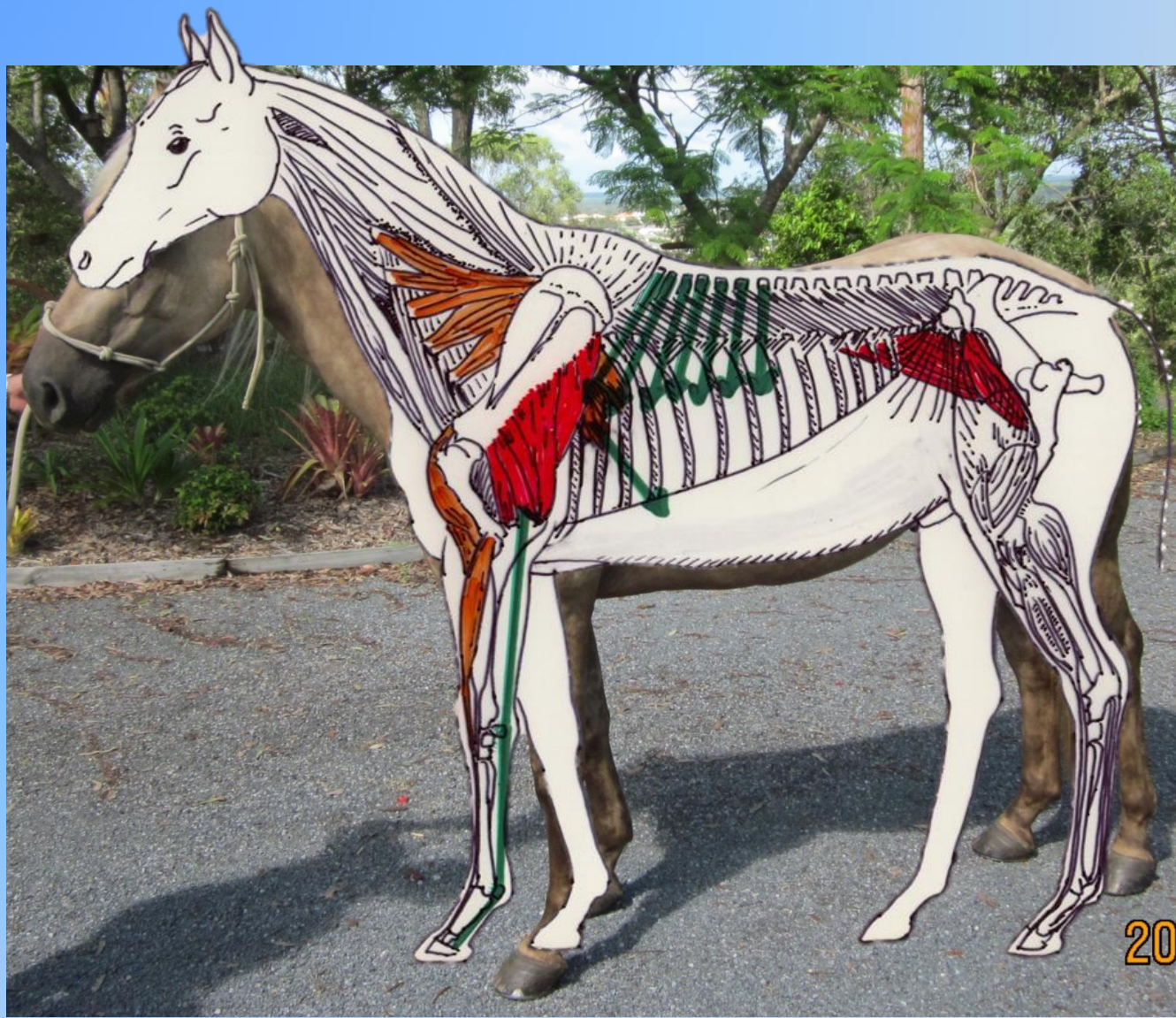
equine multifidus and SCD lateralis muscles act as caudal sagittal rotators of their vertebra of origin, as is the case in man, allowing dynamic stabilisation during dorsoventral motion.

Fatigue of Dorsal serratus and Multifidus, which is the major stabiliser. resulting back pain on ventral challenge

Fatigue of Serratus ventralis (loss of elasticity), subsequent transfer of function to spine

Foot imbalance via the PSA will alter tension on ribs and effect back pain



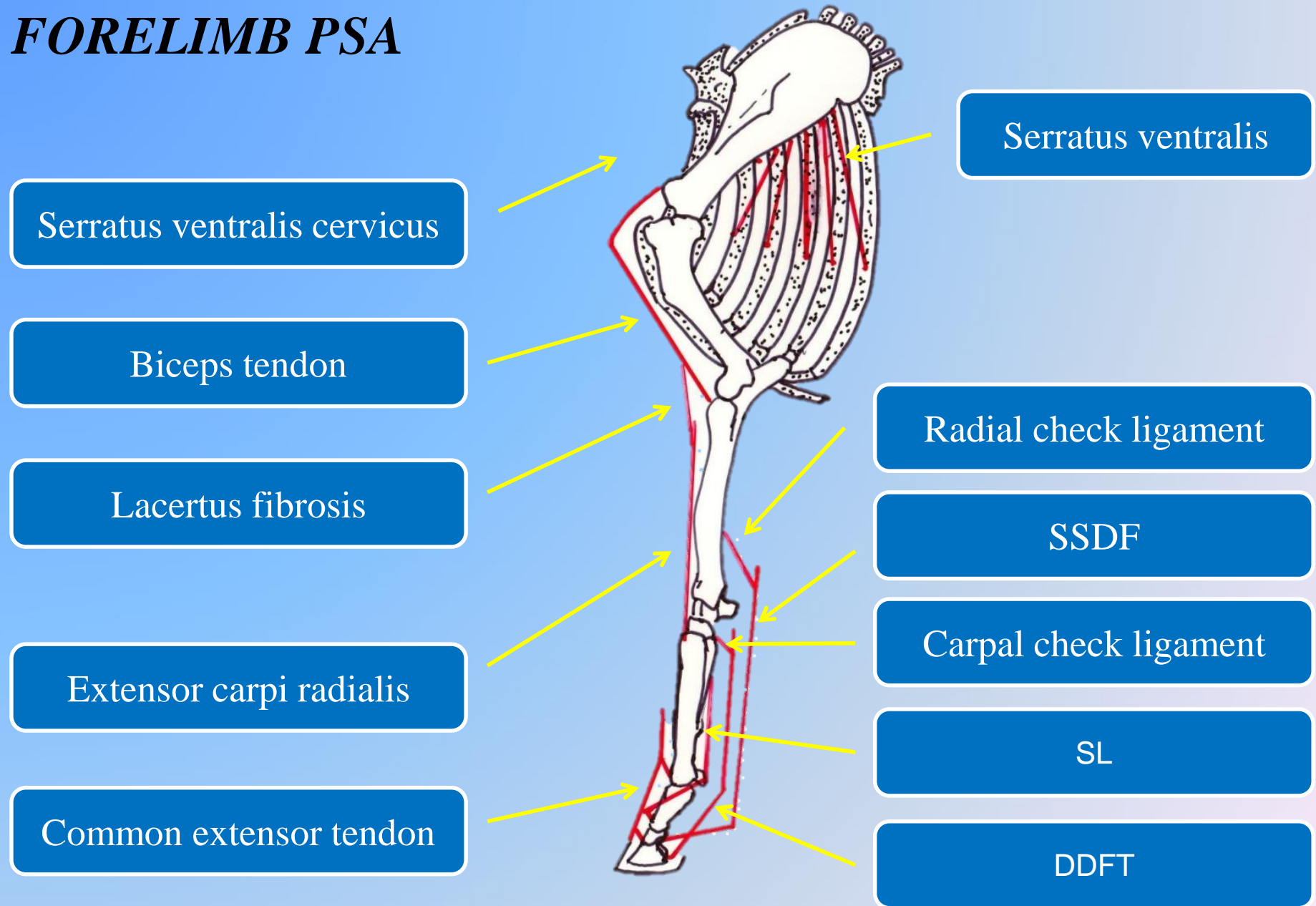




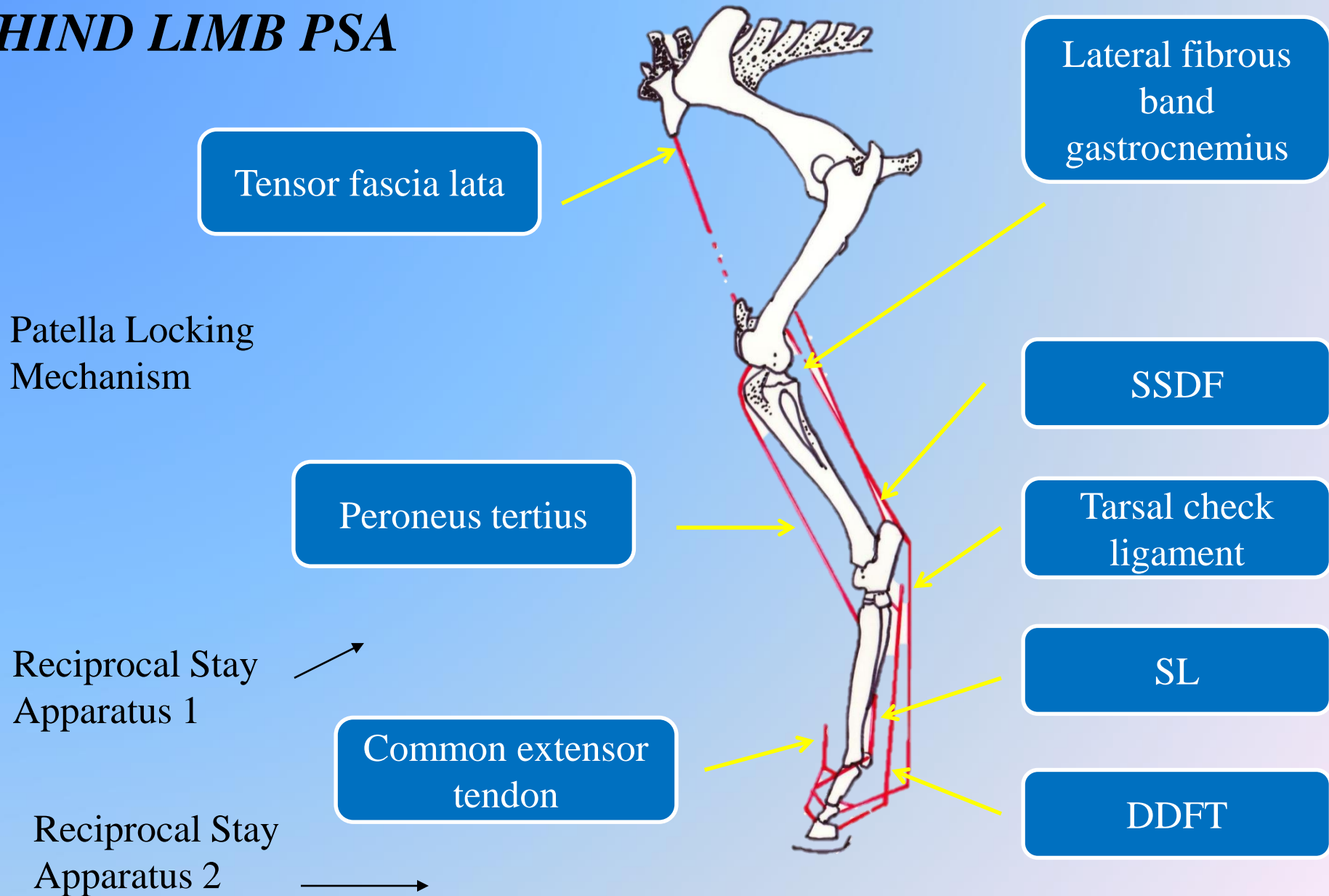
Serratus dorsalis cranial and caudal

Ashdown Done The Horse, Veterinary Anatomy 1987

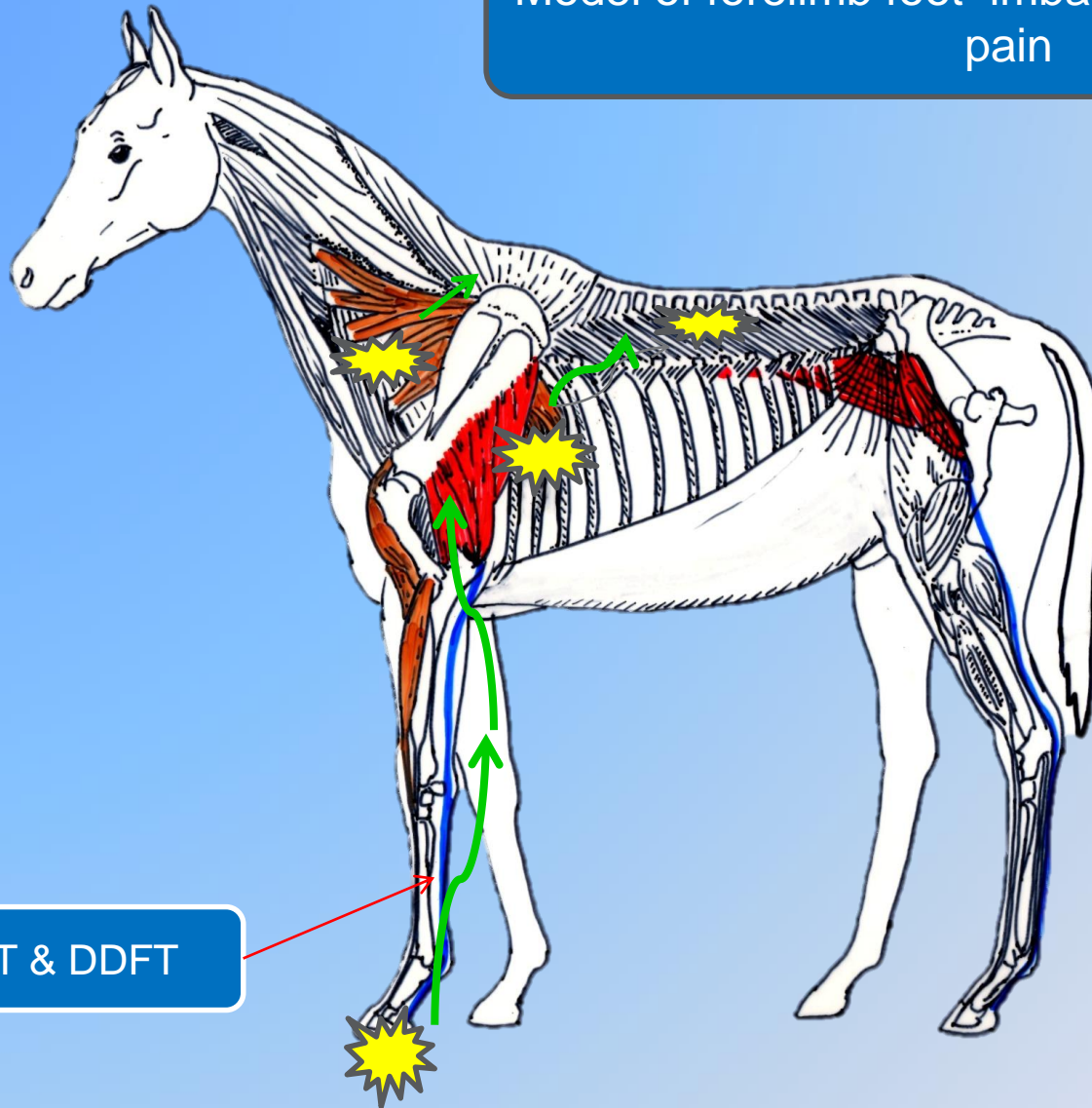
FORELIMB PSA



HIND LIMB PSA



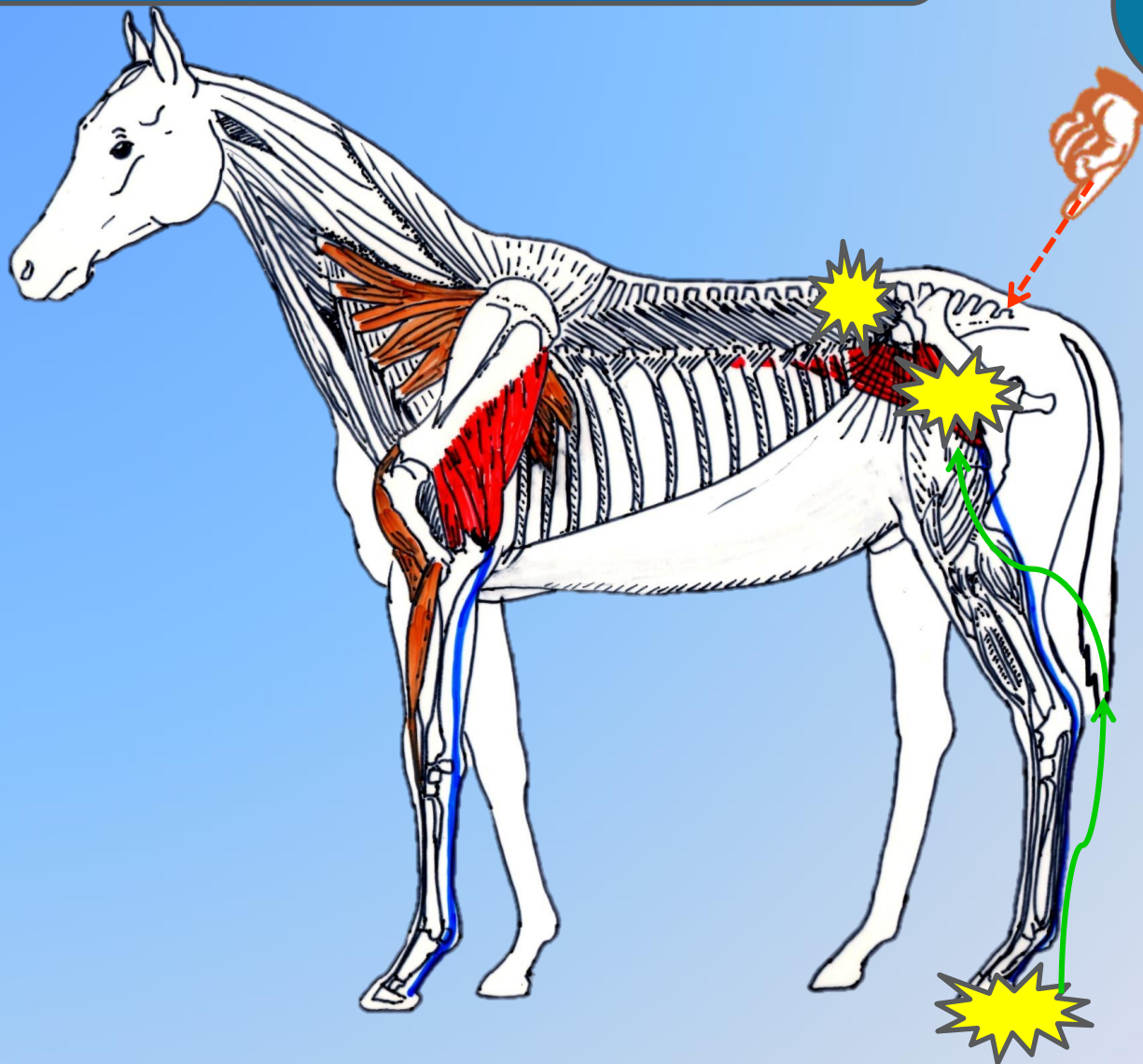
Model of forelimb foot imbalance effecting back pain



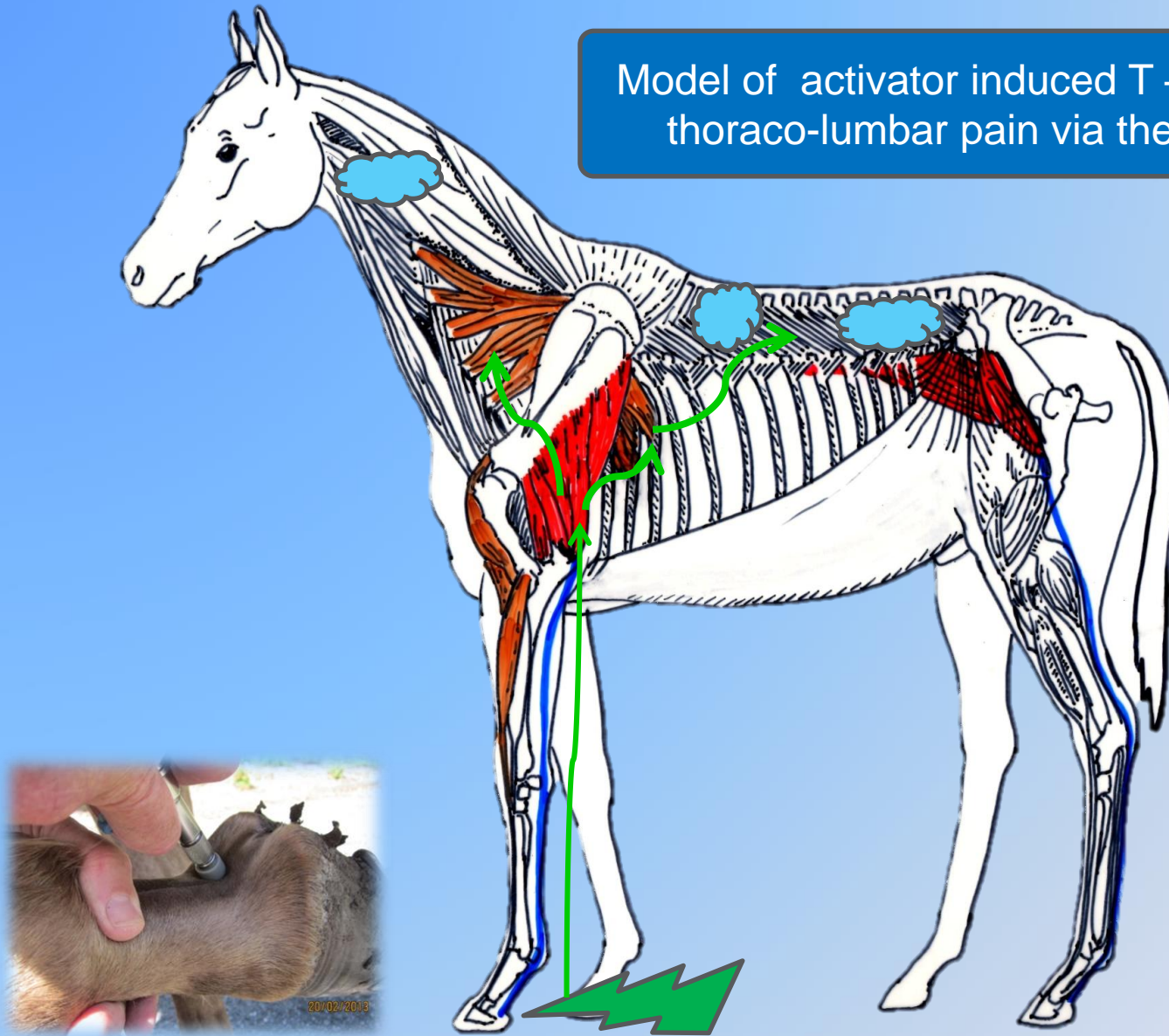
SDFT & DDFT

Model of hind limb foot imbalance/pathology
resulting in sacro –pelvic and lumbar pain

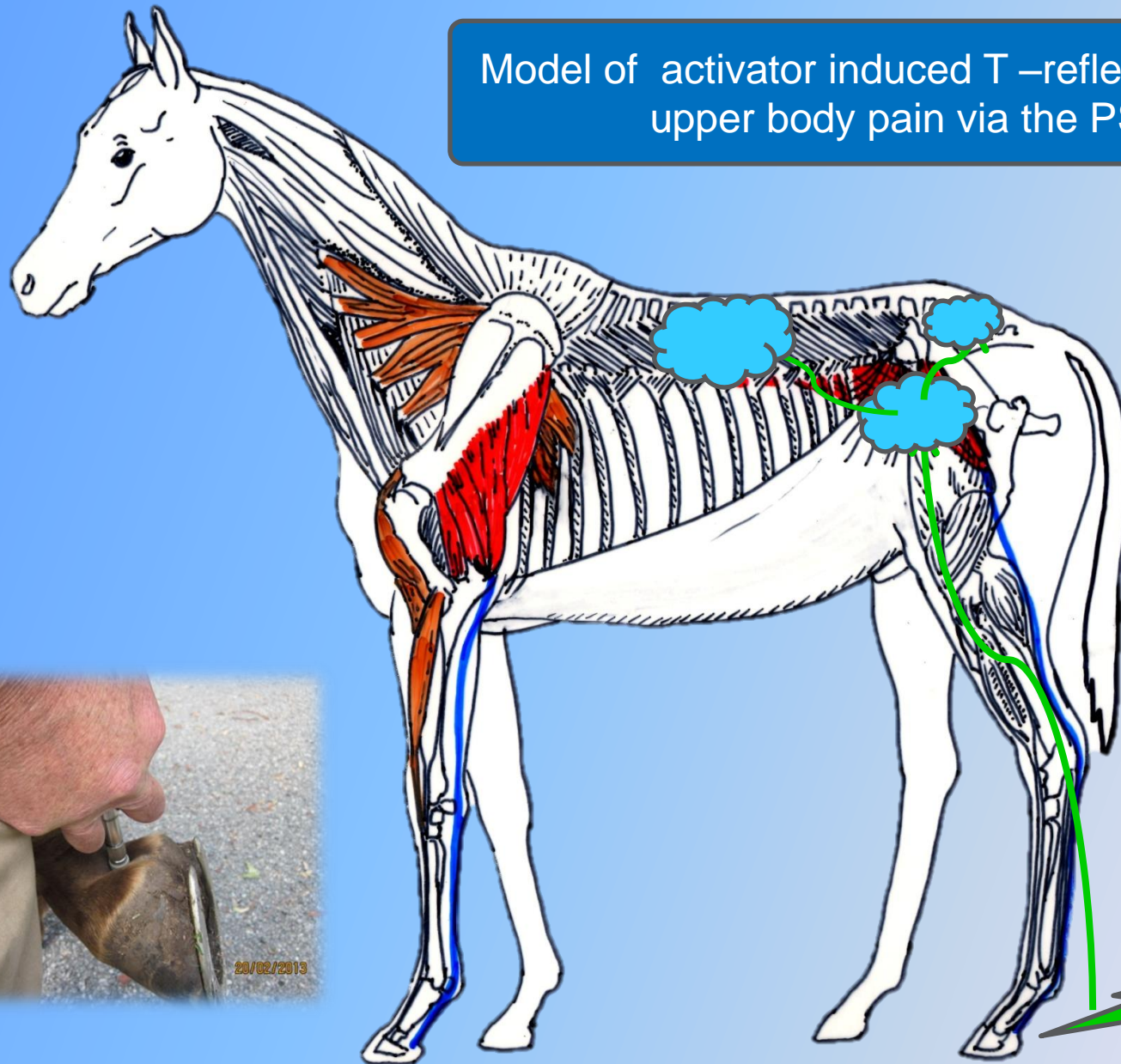
sacrocau-
dalisch
dorsalis m
?



Model of activator induced T –reflex resolving
thoraco-lumbar pain via the forelimb PSA



Model of activator induced T –reflex resolving upper body pain via the PSA



20/02/2013

NAVICULAR – DDFT STUDY CONCLUSIONS FROM PILOT STUDY



Need for better study

Need for further properly funded study

Possibly some important ramifications

CONSEQUENCES OF DYSFUNCTION

Coordination

Proprioception



Performance loss

Behaviour

Metabolism

Health changes

THANK YOU

I would like to thank you for attending this presentation.